secondly, after all this work has been done, the color differences detectable by the eye are not always sufficiently small to be of value in the investigation. The fundamental need, a method of greater sensitivity, remains.

Such was the case in the Cromwell problem when a timely advertisement in SCIENCE called the writer's attention to the color photometer. In order to test the applicability of the instrument to the study of the shales in question, the writer submitted samples of shale powders passing the one sixteenth millimeter screen to the dealer for trial tests. The results agreed so well with certain chemical determinations that the writer believes that he is warranted in suggesting the use of the color photometer in other investigations. When the investigation of the Cromwell shales is completed, it is hoped that the application of quantitative color data to petrographic research will be demonstrated conclusively. As stated in the beginning, the purpose of this brief paper is merely to make better known a color-determining device applicable to liquids, powders and massive solids, both heterogeneous and homogeneous, capable of giving quantitative data which can be presented graphically. Such an instrument may prove of great value in other geologic problems such as those dealing with changing environments under which sedimentary beds have been deposited, color changes produced in rocks during metamorphism, and in other types of investigation. The color of mineral streaks can now be placed on a quantitative basis. Doubtless, other applications will suggest themselves to the reader.

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A NEW FUNDAMENTALIST STRONGHOLD

"THE Des Moines University, Des Moines, Iowa, is now the property of the Baptist Bible Union of North America . . . A President has not been elected, but in the meantime the Board of Trustees announce that no one will be retained on the faculty who is not a Christian in the sense of having been born again . . . Some professors will teach no longer in the university because their views are decidedly modernistic . . . No professor will be retained who believes in evolution, or who does not accept the Bible as the infallible word of God . . . The highest educational standards will be maintained . . . Des Moines University will teach the supernaturalism of Christianity as opposed to the naturalism of modernism which is prevalent to-day."

The above, taken from a publication of the Baptist Bible Union, is published because the situation should be thoroughly understood by scientific men. Twenty of the faculty, including two deans, have resigned. The writer, who a year ago accepted a two-year contract as professor of biology, with the promise of freedom in the teaching of evolution is among those leaving.

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QUOTATIONS

STEEL TURNS TO RESEARCH

SCIENCE is to work for the United States Steel Corporation. To be sure, the greatest organization of its kind in the world has long had its laboratories, but it has been their main function to make more or less routine analyses and to control the processes whereby ore is converted into hundreds of products ranging from wire to girders. No startling discovery in the chemistry of iron and steel stands to their credit. The corporation has made its greatest technical strides in engineering—in lowering production costs, in introducing new machinery, in increasing tonnage. Convinced, no doubt, by the example of other large industrial organizations and above all by Sir Robert Hadfield, of Sheffield, and the great German ironmongers, the United States Steel Corporation has decided to create a department of research and technology under the direction of Dr. John Johnston, of Yale, a scientist ably qualified by technical education and experience to explore a field in which scientific and industrial honors are to be won.

Judge Gary's announcement of what his board of directors must have regarded as a daring innovation is phrased with characteristic but guarded optimism. The finance committee is to keep an eye on the research laboratory. While the corporation "has no money to waste intentionally," Judge Gary comments, "we have money to expend if necessary." Miracles are not to follow the rubbing of the lamp of science by a chemical Aladdin. "We do not expect you can go along at a very rapid rate to begin with, or, perhaps, at any time, but we will have patience, as you must all have patience."

Some research is better than none, particularly if the spirit in which it is conducted is that of the university. How successful the new department of research is destined to be must depend largely on the policy adopted. Such experienced directors of research laboratories as Dr. W. R. Whitney, of the General Electric Company, and Dr. C. Kenneth-Mees, of the Eastman Kodak Company, have argued for an absolutely free hand. Money-making must not infect the laboratory. Paradoxically, the most money is made by laboratories least concerned with it—by men who have dabbled in the Einstein theory and the mysteries of the Bohr atom and stumbled on principles applicable to industry. If purely commercial standards are to guide the research director he finds it difficult to attract men of the finest scientific type. His net result is merely a heightening of technical efficiency, an improvement in finished products. Grant a laboratory the right to work untrammeled and both science and industry gain. It was the adoption of this large-visioned policy that made the discovery of ductile tungsten possible—a discovery that unexpectedly gave us electric lamps of an economy and brilliancy undreamed of twenty years ago, radio tubes that have made broadcasting and television twentieth century triumphs, and deeply penetrating X-ray tubes that have been a boon to the sick.

The richest assets of some of our largest corporations are not their physical properties but the discoveries made in laboratories where research has been conducted for its own sake. Perhaps because these assets can not be even approximately appraised, at least one corporation carries its priceless patents on its books at the valuation of one dollar.—*The New York Times.*

SCIENTIFIC BOOKS

The Ferns (Filicales). Vol. II. *The Eusporangiatae and other relatively Primitive Ferns.* F. O. BOWER, Sc.D., LL.D., F.R.S., pp. 344, many figures. Cambridge, the University Press. 1926.

FOR more than forty years Professor Bower has been recognized as a leader in the study of the Pteridophytes; and this work, the second volume of a comprehensive treatise on the ferns, of which the first appeared in 1923, is especially welcome to those, who in these days when morphology is rather discredited still feel that the subject not only is far from exhausted, but will again be revived when some of the current botanical fashions are out-moded.

The present volume treats in detail the Eusporangiatae and the more primitive families of the Leptosporangiates, and is a contribution of the first importance. It records the latest conclusions of the author as to the structure and classification of the ferns.

Not the least valuable feature of the present volume is the attention paid to the fossil ferns, as well as to the living ones; and the comparison of the latter with their ancient relations is constantly borne in mind in an endeavor to construct a system of classification which, approximately at least, will represent the true genetic relationships, and throw light upon the origin of the existing ferns.

Professor Bower recognizes three types of sporangium-development, and on this basis he arranges the families in three categories, *viz.:* Simplices, in which all the sporangia of a sorus are formed simultaneously; Gradatae, in which they are of different ages, formed in basipetal succession; and Mixtae, in which sporangia of different ages are mingled in the same sorus. The Simplices are the most primitive, the Mixtae the most specialized.

There are two types of sorus, marginal and superficial, *i.e.,* borne on the lower surface of the leaf. The marginal sporangia are believed to be the older type, although the superficial sori are characteristic of the Marattiacae as well as of some other paleozoic ferns. The present volume deals with the Simplices and Gradatae, of which fourteen families are recognized.

Before considering the living ferns, a chapter is devoted to a group of fossils, Coenopteridaceae, which have no existing representatives. There are three families of these: Botryopterideae, Zygopterideae, and Anachoropterideae. They are all confined to the Palaeozoic, occurring from the Upper Devonian to the Permian.

The author concludes that the Coenopteridaceae include an assemblage of more or less synthetic types which may probably be assigned to the Filicales, but which do not show any close relationships with existing ferns.

Of the living Filicales, it is pretty generally admitted that the two Eusporangiate families, Ophioglossaceae and Marattiaceae, are the most primitive.

In his earlier writings Professor Bower separated the Ophioglossaceae from the Filicales, but in the present work he has restored them to a place among the ferns, where there is no doubt they belong. It is true that their exact relationship with the other ferns is not easy to determine.

While almost nothing is known of the geological history of the Ophioglossaceae, there is very strong evidence that they are the most primitive, and presumably the oldest, of the living ferns. There seem to be sufficient resemblances to the fossil Coenopterideae to warrant the assumption of a remote relationship with that order.

Although a very full description of the external morphology is given by the author, there are certain points that might be criticized. In the discussion of the venation in Botrychium, for instance (p. 43), Professor Bower emphasizes the difference between the open venation in Botrychium and the reticulate venation of Ophioglossum; but he fails to note the two types of venation found in Botrychium, although he figures these. The simpler, and probably more primitive species, *e.g., B. Lunaria, B. simplex,* have "Cyclopteroid" venation, while the larger species show a